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Technology

The technology assessment reviews the current environment and the State's technical ability to move forward.

■ The assessment looks at the key components of the current technical environment:

- ➲ Hardware
- ➲ Networks
- ➲ Operations Support
- ➲ Database
- ➲ Core Applications
- ➲ Application Interfaces
- ➲ Applications Support

Hardware

The State's central systems are provided using mainframe technology operated from a data center in the Mitchell Building.

- ■ Processing
  - ➲ The central mainframe, an IBM 9000 Model 821, is located in the Mitchell Building
  - ➲ Provides support for all mainframe core systems
  - ➲ An IBM 4381 mainframe located in the Armory provides dedicated support for Department of Justice applications
  - ➲ A DEC 4100 Alpha running Unix is also located in the Mitchell Building which provides centralized Mid-Tier client/server support

- ■ Storage
  - ➲ IBM 3390 Model 3 disk drives provide on-line data storage
  - ➲ IBM 3490 E tape drives provide off-line data storage on tape cartridges; an offsite vault is utilized for archival storage

- ■ Planned
  - ➲ a significant mainframe upgrade is planned for November 9-11/96

As required, the State invests in upgrades and new technologies.

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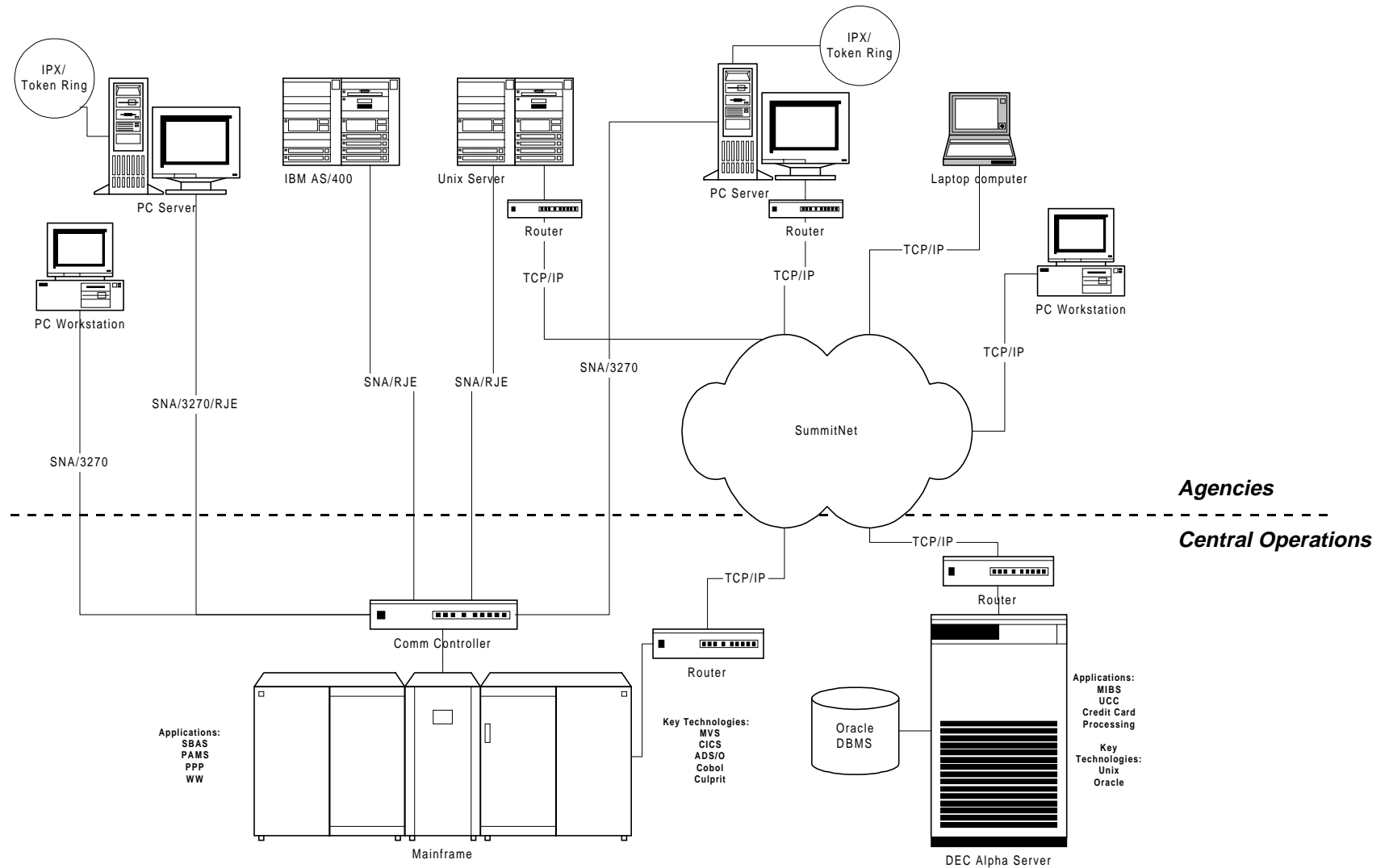December 16, 1996

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Networks

The Telecommunication Bureau has designed and implemented a reliable and state-of-the-art network facility.

■ Department of Administration provides central management of telecommunications through the State Telecommunications Network (STN). STN supports voice, data, and video via a combination of state-owned and leased facilities.

■ Data network service to major cities provided by T1 and 56 kb/s Frame Relay circuits. Smaller centers serviced by slower dial-up facilities.

■ STN support two logical networks which service state-wide applications:

➲ **SNA Network** - older technology supporting legacy mainframe centralized applications (SBAS, PPP, WW, PAMS)

➲ **SummitNet** - newer technology TCP/IP network which provides multi-protocol support (Internet/Intranet IP, Novell IPX, and DECnet) for distributed applications.

As systems and applications grow, the network must adapt and expand to meet user needs. New technologies are much more demanding of networks than traditional mainframe technologies.

Current Environment

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IPX/Token Ring

IPX/Token Ring

PC Server

IBM AS/400

Unix Server

PC Server

Laptop computer

Router

Router

TCP/IP

PC Workstation

PC Workstation

TCP/IP

TCP/IP

TCP/IP

PC Workstation

SNA/3270

SNA/3270/RJE

SNA/RJE

SNA/RJE

SNA/3270

SummitNet

SNA/3270

Agencies

Central Operations

TCP/IP

TCP/IP

Router

Comm Controller

TCP/IP

Router

Router

Applications:
SBAS
PAMS
PPP
WW

Key Technologies:
MVS
CICS
ADS/O
Cobol
Culprit

Oracle DBMS

Applications:
MIBS
UCC
Credit Card Processing

Key Technologies:
Unix
Oracle

Mainframe

DEC Alpha Server

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Operations Support

Central information technology services ensure reliability, asset protection, end-to-end connection management, acceptable performance, for a reasonable fee.

- Availability
  - Mainframe and mid-tier server operations are available 24 hours/day, 7 days/week providing:
    - ⇒ automated job scheduling
    - ⇒ automated report distribution
    - ⇒ network support (SNA and SummitNet)
    - ⇒ scheduled upgrades

- Funding
  - Operates as a self-funding service bureau with cross-charges to all departments using a common rate structure

- Operations
  - operated by the Central Computer Operations Bureau
  - facility is located in the Mitchell Building
  - central facility also houses voice and video services

- Services managed
  - mainframe and centralized mid-tier computing
  - telecommunications center
  - network control center
  - automated printing facilities and APF printing support
  - technical services
  - media management
  - security

- Planned
  - technical and operational support for other state-wide distributed applications running on Unix and/or Microsoft™ Windows/NT
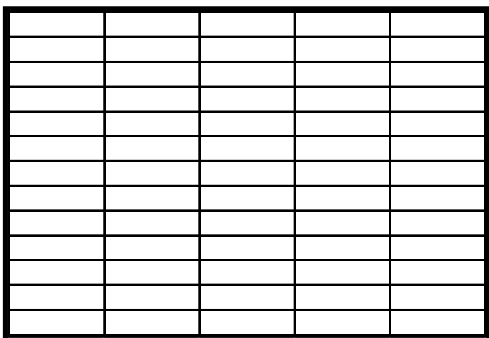
- Issues
  - recently acquired network management and trouble ticket reporting tools have not been widely deployed.

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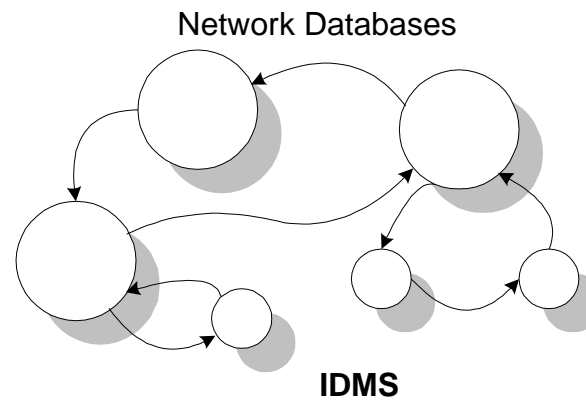
Databases

Current Mainframe Data Management:

Network Databases

and

IDMS

■ Flat Files
- ➲ Traditional mainframe file organization (VTAM)

■ Network Databases
- ➲ IDMS is used to provide improved access and mangement for mainframe
- ➲ Dated technology platform with limited life span

Emerging Relational Data Management:

■ Relational Databases
- ➲ Oracle adopted as the relational database management platform.
- ➲ Oracle 2000 advanced development environment toolset for future development projects.

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Core Applications

These core applications were constructed over two decades ago using technologies that were leading edge at the time. Their longevity testifies to the quality of the original construction.

- ■ Mainframe based
  - ➲ computing power highly centralized
  - ➲ accessed through 3270 emulation
  - ➲ primary programming language COBOL
  - ➲ programs structured but

- ■ Data in proprietary formats
  - ➲ VSAM
  - ➲ IDMS
  - ➲ difficult to access and manipulate

- ■ Reporting requires programming by specialized personnel
  - ➲ COBOL report writer
  - ➲ Culprit reporting language

- ■ On-line facilities
  - ➲ uses ADS/O facilities for on-line edit and entry (OE&E)
  - ➲ data provided by larger agencies via RJE
  - ➲ limited history of data available on-line (1 month in SBAS)

- ■ Implications
  - ➲ incrementally added functionality has made programs increasingly complex
  - ➲ increasing effort required to add new functionality
  - ➲ access to off-line data tedious and time consuming
  - ➲ Year 2000 problems identified (SBAS, PPP, PAMS)

The core applications were also built to support a mode of government operations that no longer exists.

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Application Interfaces

Interfaces between the applications are custom-built, and contribute to the complexity of the environment.

- Data interfaces exist between the core systems and numerous agency systems.

- Most interfaces use SNA/RJE or SNA/3270 facilities.

- Agency reviews indicated not all agencies are aware of the interfaces which are available.

- E-mail is used to provide detailed information for transactions, but not all agencies are able to communicate with current e-mail products.

- Increasing use of internet and intranet communications in large agencies.

A significant impact of implementing any new core systems will be the need to construct interfaces with agency applications in the existing environment.

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Application Support

Application support ensures that core systems continue to respond to business needs, and is critical to ensuring continued delivery of mission critical services.

- Core Systems Support
  - ➲ Programmers from ISD's Systems Suppeor Bureau provide primary support for core systems:
    - ⇒ SBAS
    - ⇒ PPP
    - ⇒ Warrant Writer
    - ⇒ PAMS

- ISD offers a state-wide MIS contract utilized by many agencies to obtain support for core applications and desktop technologies

- Growing competition for limited mid-tier and Oracle DBMS support

- Extremely limited support for e-mail, Internet/Intranet and other mail-enabled activities

Application support is very thin and is vulnerable to staff turnover. The age of the core systems creates a long learning curve for new support resources.

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Consistency with IM Principles

This matrix compares the current technical environment with the IM Principles regarding functionality and accessibility.

FUNCTIONALITY

Legend ○ Good Performance ◑ Average Performance ● Poor Performance	Current Technical Environment	Observations
Flexible, Adaptable Information Systems	●	Difficult to implement new business requirements
Comprehensive, Robust Functionality	◑	Provides required functionality but not robust
Integrated Functionality	●	Integration is through batch file transfers
Advanced Reporting Capabilities	●	Report generation requires programming skills
Responsive to Both Corporate and Departmental Needs	◑	Ability to respond constrained by resource shortages
Incorporates Best Business Practices	●	Do not incorporate best practices
Both Commercial and Public Sector attributes and Capabilities	○	Fully compliant
Consistent State-Wide Information for Analysis and Reporting	●	Departmental systems inconsistent with core systems
Performance Measurement Capability	○	Technical performance measures are reliable

ACCESSIBILITY

Legend ○ Good Performance ◑ Average Performance ● Poor Performance	Current Technical Environment	Observations
Shared Systems, Common Across Government	○	Provides common, shared systems
Broad Access to Stakeholders (i.e., Public, Suppliers, Employment	●	Accessible only to government employees
Supports Single Point of data Entry at Source	●	Multiple and redundant points of data entry across State

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Consistency with IM Principles (cont'd)

This matrix compares the current technical environment with the IM Principles regarding operations and technical platform.

OPERATIONS

Legend ○ Good Performance ◔ Average Performance ● Poor Performance	Current Technical Environment	Observations
Easily Integrated and Interfaced with Operational Systems	○	Standard interface for incoming data, non-standard for outputs to Agencies
Easily Upgraded	●	Increasingly difficult to maintain due to ageing Cobol code
Low Cost Maintenance	○	Knowledge able resources are provided at low rates
Inexpensive to Operate	○	Mainframe processing rates continue to decline
Easy to Learn and Use	●	Systems not easy to learn and use

TECHNICAL PLATFORM

Legend ○ Good Performance ◔ Average Performance ● Poor Performance	Current Technical Environment	Observations
Year 2000 Compliance	●	Year 2000 changes are significant (estimates currently being prepared)
Consistent with Established Standards	○	Mainframe environment uses industry standard tools
Open Systems Compliant	●	Not open systems compliant (except new mid-tier applications)
Supports Diverse Technology Base	●	Difficult to support modern and emerging technologies

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Assessment

Historically, the State has managed its information technology resources well, however:

- Central Computer Operations service provided is relatively high quality on traditional measures (reliability, service levels), but not meeting all customer needs.

- Telecommunications facilities and expansion plans are progressive and will serve the State well in the foreseeable future.

- Technical service and application support provided at relatively low cost, but support is vulnerable to turnover.

- Mid-tier facilities are state-of-the-art and evolving along accepted industry standards but inadequate resources and training at present.

Assessment (cont'd)

The State has progressed well in preparing for the future business and information technology environments:

- ■ **SummitNet**
  - ➲ proactive steps to be ready for change
  - ➲ good structure for distributed systems
  - ➲ growth in usage will require innovations, tools and resources

- ■ **Oracle database and tools**
  - ➲ positive steps for future development
  - ➲ extremely limited support

- ■ **State needs to develop standards and monitor emerging technologies:**

● E-mail/ Groupware	● Bar Coding
● Workflow	● GIS
● Electronic Commerce	● Intranet/Internet

To take advantage of these emerging technologies, a state-wide Technology Architecture should be developed so that new systems can potentially be as long-lived as the previous investment

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Assessment (cont'd)

The future holds challenges, opportunities and risks:

- ■ Challenges
  - ➲ distributed systems support
  - ➲ client desktop support and software distribution
  - ➲ multiple vendor environment support
  - ➲ managing changes in a rapidly changing technology environment
  - ➲ changing the skills profile fast enough to support new applications and networks
  - ➲ maintaining the skills profile to support existing dependencies
  - ➲ encouraging innovative thinking, flexibility and tolerance to help implement dramatic change
  - ➲ support of non-government clients (public, vendors, other jurisdictions, etc.)

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Assessment (cont'd)

■ Opportunities

➲ Networks

⇒ broad adoption of SummitNet for distributed core applications and adoption of automated network management tools and methods

⇒ integration of voice, video and data networks into a single logical network to achieve effective bandwidth utilization and availability.

➲ Application Support

⇒ continuing with mid-tier installations to support distributed applications

⇒ combining network support and first-level application support into a single help desk operation will free up application support personnel for more detailed support activities

⇒ automated help desk and software distribution tools will become essential to support distributed client-server applications

➲ State-Wide E-Mail

⇒ selection of Montana's state-wide e-mail should be made with an understanding of the technical direction of MT Prime and include non-proprietary Internet access

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Assessment (cont'd)

■ **Opportunities cont'd**

➲ Electronic Commerce

⇒ opportunities to issue licenses and permits and to collect revenues electronically will become more significant as Internet technologies mature.

➲ Intranets

⇒ expanding the use of Internet and Intranet technologies to implement new user-accessible systems

➲ Technology Architecture Planning

⇒ state-wide technology planning to provide guidelines to agencies in gaining experience with new technologies

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Assessment (cont'd)

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■ Risks

➲ declining mainframe volumes will not likely result in proportional cost reductions at the central mainframe site since the present minimal staff levels will need to be maintained

➲ alternative funding sources must be found to support the deployment of mid-tier applications and new technology planning, research and development as mainframe revenues decline

➲ ability to make rapid, cost-effective decisions and to have an enabling framework that allows agencies to quickly respond to changing needs will become even more critical as the client-server model becomes firmly entrenched